

REMARKS

In the final Office Action, the Examiner rejects claims 21- 26 under 35 U.S.C. § 102(e) as anticipated by AGGARWAL et al. (U.S. Patent Application No. 6,330,614 B1); and rejects claims 10-12, 17-20, and 27-33 under 35 U.S.C. § 103(a) as unpatentable over ANDERSSON et al. (U.S. Patent Application No. 7,023,846 B1) in view of HARIGUCHI et al. (U.S. Patent Application No. 6,956,858 B2). Applicants respectfully traverse this rejection. Claims 10-12 and 17-33 are pending.

Rejection under 35 U.S.C. § 102(e) based on AGGARWAL et al.

Claims 21-26 stand rejected under 35 U.S.C. § 102(e) as allegedly anticipated by AGGARWAL et al. Applicants respectfully traverse this rejection.

A proper rejection under 35 U.S.C. § 102 requires that a reference teach every aspect of the claimed invention. Any feature not directly taught must be inherently present. See M.P.E.P. § 2131. AGGARWAL et al. does not disclose or suggest the combination of features in Applicants' claims 21-26.

For example, claim 21 recites, in a router containing a plurality of forwarding tables, a method of packet forwarding that includes receiving a packet at an ingress interface; classifying the received packet based on at least a first field value contained in the header of the packet; associating one of the plurality of forwarding tables to the packet according to its classification; performing a lookup operation in the associated forwarding table according to at least a second field value contained in the header of the packet; determining an egress interface based on the lookup operation; and transmitting the received packet from the determined egress interface. AGGARWAL et al. does not disclose or suggest this combination of features.

For example, AGGARWAL et al. does not disclose or suggest classifying a received packet based on at least a first field value contained in a header of the packet and associating one of a plurality of forwarding tables to the packet according to its classification. The Examiner relies on column 5, lines 1-8 of AGGARWAL et al. as allegedly disclosing these features of claim 21 (final Office Action, pg. 15). Applicants respectfully disagree with the Examiner's interpretation of AGGARWAL et al.

At column 5, lines 1-8, AGGARWAL et al. discloses:

...examining the destination network address in the header, it knows which one of the local interfaces to which to forward the datagram. Using these two tables, the Routing Table and the Forwarding Table, later more fully discussed, a datagram that enters the network can thus be forwarded to the eventual destination by examining the datagram header and looking up the Forwarding Table to find the next interface to which to send the datagram.

This section of AGGARWAL et al. discloses that a datagram that enters a network can be forwarded to an eventual destination by examining the datagram header and looking up the Forwarding Table to find the next interface to which to send the datagram.

AGGARWAL et al. further discloses that each router creates a Forwarding table that maps a destination network address to one of its interfaces (column 4, lines 63-65).

Therefore, AGGARWAL et al. discloses that a router looks up a next interface using the router's Forwarding Table. AGGARWAL et al. does not disclose associating one of a plurality of forwarding tables to the packet according to its classification. Rather, AGGARWAL et al. discloses using a header to look up a forwarding destination in a single Forwarding Table. Therefore, AGGARWAL et al. does not disclose or suggest classifying a received packet based on at least a first field value contained in a header of the packet and associating one of a plurality of forwarding tables to the packet according to its classification, as recited in claim 21.

For at least the foregoing reason, Applicants submit that claim 21 is not anticipated by AGGARWAL et al.

Claims 22-25 depend from claim 21. Therefore, these claims are not anticipated by AGGARWAL et al. for at least the reasons given above with respect to claim 21.

Independent claim 26 recites features similar to, yet possibly of different scope than, features recited above with respect to claim 21. Therefore, claim 26 is not anticipated by AGGARWAL et al. for at least reasons similar to the reasons given above with respect to claim 21.

**Rejection under 35 U.S.C. § 103(a) based on ANDERSSON et al. and
HARIGUCHI et al.**

Claims 10-12, 17-20, and 27-33 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over ANDERSSON et al. and HARIGUCHI et al. Applicants respectfully traverse this rejection.

Independent claim 10 is directed to a method of configuring a networking device. The method includes generating a first forwarding table; generating a second forwarding table; programming a filter to perform a lookup operation in the first forwarding table if a first field value of a received packet meets one or more conditions of a first set of conditions; and programming the filter to initiate a lookup operation in the second forwarding table if the first field value does not meet one or more conditions of the first set of conditions. ANDERSSON et al. and HARIGUCHI et al., whether taken alone or in any reasonable combination, do not disclose or suggest this combination of features.

For example, ANDERSSON et al. and HARIGUCHI et al. do not disclose or suggest programming a filter to perform a lookup operation in a first forwarding table if a

first field value of a received packet meets one or more conditions of a first set of conditions and programming the filter to initiate a lookup operation in a second forwarding table if the first field value does not meet one or more conditions of the first set of conditions, as recited in claim 10. The Examiner admits that ANDERSSON et al. does not disclose these features (final Office Action, pg. 3). To remedy this deficiency, the Examiner relies on the abstract, Figs. 3 and 36, column 2, lines 16-44, and column 5, lines 43-54 of HARIGUCHI et al. for allegedly disclosing the above features of claim 10 (final Office Action, pp. 3-4). Applicants note that there are there is no Fig. 36 in the HARIGUCHI et al. document. Applicants further disagree with the Examiner's interpretation of HARIGUCHI et al.

In the abstract, HARIGUCHI et al. discloses:

A routing table circuit for a router has one or more input ports and output ports for message communication. In the routing table circuit, one or more routing table memories store a plurality of routing table arrays. The routing table arrays are arranged hierarchically in levels, and each routing table array is associated with a predetermined subset of prefixes. Each routing table array has entries. The entries include a block default route pointer field to store a block default route pointer, if any, and a routing field. The route engine may access any level of table array by using a next level route pointer stored in the routing field. Using the block default route and the routing field, the present invention further reduces the number of memory accesses and the update cost for route insertion and deletion by identifying and skipping elements that do not require route updating.

This section of HARIGUCHI et al. discloses that, using a block default route and a routing field, a number of memory accesses and the update cost for route insertion and deletion into a routing table may be reduced by identifying and skipping elements that do not require route updating. This section of HARIGUCHI et al. does not disclose that the routing table is used to search for a route when a first value of a received packet meets one or more conditions of a first set of conditions. In fact, this section of HARIGUCHI et al. does not disclose or suggest a set of conditions at all. Therefore, this section of

HARIGUCHI et al. does not disclose or suggest programming a filter to perform a lookup operation in a first forwarding table if a first field value of a received packet meets one or more conditions of a first set of conditions and programming the filter to initiate a lookup operation in a second forwarding table if the first field value does not meet one or more conditions of the first set of conditions, as recited in claim 10.

In Fig. 3, HARIGUCHI et al. illustrates a router that uses a routing table to search for a route corresponding to a destination address in a fixed, deterministic, amount of time (column 7, lines 39-41). HARIGUCHI et al. does not disclose that the routing table is used to search for a route when a first value of a received packet meets one or more conditions of a first set of conditions. In fact, Fig. 3 of HARIGUCHI et al. does not disclose or suggest a set of conditions at all. Therefore, Fig. 3 of HARIGUCHI et al. does not disclose or suggest programming a filter to perform a lookup operation in a first forwarding table if a first field value of a received packet meets one or more conditions of a first set of conditions and programming the filter to initiate a lookup operation in a second forwarding table if the first field value does not meet one or more conditions of the first set of conditions, as recited in claim 10.

At column 2, lines 16-44, HARIGUCHI et al. discloses:

To determine a route, one prior art routing table architecture uses a hash table. In hash-based routing tables, two tables and one special route entry are typically used. The first table, `rt_host`, is used for host routes and stores IP host addresses and output ports. The second table, `rt_net`, is used for network routes and stores IP network addresses and their route information. The special route entry specifies a default route. When a packet is being routed, the router searches the first table, `rt_host`, for host routes, if any. The router performs the search by comparing the destination address to the IP host addresses in the routing table. When no IP host address in the first table matches the destination address, the first table does not specify the host route and the search fails. When the search of the first table fails to find a host route, the router searches the second table, `rt_net`, to determine a network route, if any, using the destination address and the IP network addresses stored in the second table. When no IP network address in

the second table matches the destination address, the second table does not specify the network route and the search fails. When the search of the second table fails to find a network route, the router uses the default route, if specified.

The first and second tables, `rt_host` and `rt_net`, respectively, are usually implemented as hash tables. For the first table, `rt_host`, routers use the entire destination IP host address in the incoming packet as a hash key to determine a starting pointer to a linked list in the first table. A linear search is performed through the linked list to determine whether the destination IP host address matches any entry in the linked list. If so, this matching entry, which has the host route, is returned.

This section of HARIGUCHI et al. discloses that, when a packet is routed, the router searches the first table for host routes, if any. When no IP host address in the first table matches the destination address of the packet, the router searches a second table to determine a network route, if any, using the destination address and the IP network addresses stored in the second table. HARIGUCHI et al. discloses automatically searching in the first table. In other words, HARIGUCHI et al. discloses performing a lookup operation in a first table regardless of whether a field of a packet meets one or more conditions of a first set of conditions. Therefore, this section of HARIGUCHI et al. does not disclose or suggest programming a filter to perform a lookup operation in a first forwarding table if a first field value of a received packet meets one or more conditions of a first set of conditions and programming the filter to initiate a lookup operation in a second forwarding table if the first field value does not meet one or more conditions of the first set of conditions, as recited in claim 10.

At column 5, lines 43-54, HARIGUCHI et al. discloses:

One embodiment of the invention provides a routing table circuit that comprises a route engine and one or more routing table memories storing a plurality of routing table arrays. The routing table arrays are arranged hierarchically in a plurality of levels, and each routing table array is associated with a predetermined subset of prefixes of the IP address. Each routing table has a plurality of entries. The entries include a block default route pointer field to store a block default route pointer, if any, and a routing field. The routing field may store a route pointer or a next level pointer to one of the routing tables in another

level. A route engine selects the block default route pointer or the route pointer as a return route pointer based on the destination address.

This section of HARIGUCHI et al. discloses a plurality of routing table arrays arranged hierarchically in a plurality of levels, where each routing table array is associated with a predetermined subset of prefixes of the IP address. A level zero array is associated with the first sixteen bits of the destination address; a level one array is associated with the next eight bits of the destination address; and a level two array is associated with the last eight bits of the destination address (column 9, lines 11-29). When searching for a route in the array, an index into the level 0 array is generated based on the first sixteen bits of the destination address. The routing field stores a pointer to the level 1 array. Based on the pointer to the level 1 array and a subset of bits associated with the destination address, the level 1 array is accessed (column 14, lines 18-32). Therefore, HARIGUCHI et al. discloses that the level zero array is first accessed and then subsequent arrays may be accessed based on the routing fields of the level zero array. As such, assuming the level zero array of HARIGUCHI et al. can be construed as corresponding to the first forwarding table of claim 10 (a point that Applicants do not concede), HARIGUCHI et al. does not disclose or suggest programming a filter to perform a lookup operation in the level zero array if a first field value of a received packet meets one or more conditions of a first set of conditions, as would be required by HARIGUCHI et al. based on the Examiner's interpretation of claim 10. Rather, as noted above, HARIGUCHI et al. discloses that a lookup operation is first performed in the level zero array. Therefore, HARIGUCHI et al. does not disclose or suggest programming a filter to perform a lookup operation in a first forwarding table if a first field value of a received packet meets one or more conditions of a first set of conditions and programming the filter to

initiate a lookup operation in a second forwarding table if the first field value does not meet one or more conditions of the first set of conditions, as recited in claim 10.

In response to similar arguments made in a previous response, the Examiner alleges that HARIGUCHI et al. discloses the above feature of claim 10 by disclosing that “the route engine may access any level of table array by using a next level route pointer stored in the routing field’, ‘when a packet is being routed, the router searches the first table, rt_host, for host routes,...the first table, rt_host, routers use the entire destination IP address in the incoming packet as a hash key to determine a starting pointer...’” (final Office Action, pg. 19). Applicants respectfully disagree with the Examiner’s allegation.

As noted above, HARIGUCHI et al. discloses that, when a packet is routed, the router searches the first table for host routes, if any. When no IP host address in the first table matches the destination address of the packet, the router searches a second table to determine a network route, if any, using the destination address and the IP network addresses stored in the second table. HARIGUCHI et al. discloses automatically searching in the first table. In other words, HARIGUCHI et al. discloses performing a lookup operation in a first table regardless of whether a field of a packet meets one or more conditions of a first set of conditions. Therefore, this section of HARIGUCHI et al. does not disclose or suggest programming a filter to perform a lookup operation in a first forwarding table if a first field value of a received packet meets one or more conditions of a first set of conditions and programming the filter to initiate a lookup operation in a second forwarding table if the first field value does not meet one or more conditions of the first set of conditions, as recited in claim 10.

For at least the foregoing reasons, Applicants submit that claim 10 is patentable over ANDERSSON et al. and HARIGUCHI et al., whether taken alone or in any reasonable combination.

Claims 11 and 12 depend from claim 10. Therefore, these claims are patentable over ANDERSSON et al. and HARIGUCHI et al., whether taken alone or in any reasonable combination, for at least the reasons given above with respect to claim 10.

Independent claims 17, 27, and 30 recite features similar to (yet possibly of different scope than) features described above with respect to claim 10. Therefore, Applicants submit that claims 17, 27, and 30 are patentable over ANDERSSON et al. and HARIGUCHI et al., whether taken alone or in any reasonable combination, for at least reasons similar to reasons given above with respect to claim 10.

Claims 18-20 depend from claim 17. Therefore, these claims are patentable over ANDERSSON et al. and HARIGUCHI et al., whether taken alone or in any reasonable combination, for at least the reasons given above with respect to claim 17.

Claims 28 and 29 depend from claim 27. Therefore, these claims are patentable over ANDERSSON et al. and HARIGUCHI et al., whether taken alone or in any reasonable combination, for at least the reasons given above with respect to claim 27.

Claims 31-33 depend from claim 30. Therefore, these claims are patentable over ANDERSSON et al. and HARIGUCHI et al., whether taken alone or in any reasonable combination, for at least the reasons given above with respect to claim 30.

Conclusion

In view of the foregoing remarks, Applicants respectfully request the Examiner's reconsideration of this application, and the timely allowance of the pending claims.

As Applicants' remarks with respect to the Examiner's rejections overcome the rejections, Applicants' silence as to certain assertions by the Examiner in the Office Action or certain requirements that may be applicable to such assertions (e.g., whether a reference constitutes prior art, reasons for modifying a reference and/or combining references, assertions as to dependent claims, etc.) is not a concession by Applicants that such assertions are accurate or that such requirements have been met, and Applicants reserve the right to dispute these assertions/requirements in the future.

While the present application is now believed to be in condition for allowance, should the Examiner find some issue to remain unresolved, or should any new issues arise which could be eliminated through discussions with Applicants' representative, then the Examiner is invited to contact the undersigned by telephone to expedite prosecution of the present application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

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